

Hennebique's Journal *le Béton Armé*. A Close Reading of the Genesis of Concrete Construction in Belgium

Stephanie Van de Voorde
Ghent University, Ghent, Belgium

ABSTRACT: In June 1898, François Hennebique issued the monthly journal *Le Béton Armé*. Published until 1939, with 378 issues in all, this platform on the interface between information and propaganda serves as a perfect means to obtain a comprehensive overview of Hennebique's legacy. Giving an insight into the increasing sphere of action, the growing number of applications and the hierarchic structure and policy of the firm, the journal is a work of reference, essential to document the unremitting development of concrete construction. By means of a close reading (based on the collections preserved at Ghent University and the *Centre d'archives du XXe siècle de l'ifa* in Paris), the content, meaning, and changing discourse of *Le Béton Armé* will be critically analyzed. Fitting within the scope of a PhD on the history of concrete construction in Belgium (www.architecture.ugent.be/concrete), particular attention will be given to the application of 'le système Hennebique' in Belgium.

FRANÇOIS HENNEBIQUE (1842-1921)

In the field of construction history, François Hennebique (1842, Neuville-Saint-Vaast – 1921, Paris) is well known, not to say almost a phenomenon or a legend. His monopoly position in the field of concrete construction around the turn of the twentieth century, in particular in France, Switzerland and Belgium, has been recognized by numerous scholars (e.g. Delhumeau 1992a; Delhumeau et al. 1993; Delhumeau 1999; Potié (ed.) et al. 1992; Simonnet 1992; Simonnet 2005).

Hennebique started his career in the building industry in the North of France as a bricklayer and later as a building supervisor. In 1867 he moved to Belgium, where he set up a contracting company (first in Courtrai and soon after in Brussels). During the first years of his career, prior to his 'hegemony' in reinforced concrete, Hennebique was among other things responsible for the *Belgian façade* at the 1878 World's Fair in Paris and some engineering works in Spain (1884). In 1887-1888, in cooperation with the Belgian architect Léon Govaerts, Hennebique aspired to construct a 300m high tower in Brussels. As it was intended as a temporary construction to add lustre to the national holiday –the analogy with the Eiffel tower evidently comes to the fore– the tower was designed in wood. The second floor however, accommodating a hotel, was to be constructed in reinforced concrete, which –if realized– had been one of the first public applications of reinforced concrete (Gallotti 1902 (45), p. 115). The tower was never realized, but it had roused the public interest which Hennebique was probably looking for (Delhumeau 1999, p. 18).

The invention of the new material

During his lengthy stay in Belgium, Hennebique laid the foundations of the empire of '*le Béton Armé système Hennebique*'. Endeavouring to disclose the genesis of the new material and to unravel who this self-made man was, scholars mainly had to resort to the autobiographical notes that Hennebique issued in *Le Béton Armé* (Gubler 1993, p. 17). For instance, Hennebique referred to three houses he built in Belgium using his newly invented type of floor construction in reinforced concrete, yet he mentioned them simply by way of illustration (Hennebique 1889 (10), p. 4; Hennebique 1889 (11), pp. 1-2). Except for the villa constructed in Lombardsijde (Middelkerke) for A. Madoux in 1889, of which the picture also figured on the cover of *Le Béton Armé* (Fig. 1), Hennebique did not mention them by name, nor did he elaborate on the precise circumstances of the commissions. Delhumeau denominated the two other examples: the country house in Mendonk (a formerly inde-

pendent municipality near Ghent) by order of Van Overloop (1879) and the villa in Nieuwpoort for Henri Crombez (1889-1890). Nevertheless, because the villa Madoux is in fact Hennebique's first identifiable construction, it can be considered as the first application of reinforced concrete proper (Delhumeau 1999, pp. 37-43). The initial phase of reinforced concrete, from his first experiments in Belgium until 1892, is shrouded in mysteries, or as Delhumeau puts it: "There is a lot of mystery about the Hennebique before Hennebique" [translated by the author (transl.)] (Delhumeau, 1999, p. 18). In point of fact, *le système Hennebique* did not come onto the building market 'fully armed' all at once; it took ten or fifteen years to fine-tune the system (Delhumeau 1999, pp. 30-31).

The foundation of his *bureau d'études* in 1892 in Brussels (transferred to Paris in 1897) marks an important turning point: Hennebique no longer presented himself as a contractor, but as an independent agent, providing expertise and know-how (Simonnet 2005, pp. 65-70). The expertise was ratified by his renowned patents: leaving aside the premature patent of 1886, the first important patents were granted on 9 February 1892 in Belgium (with a crucial addition dd 9 July 1892) and on 8 August 1892 in France, entitled *Combinaison particulière du métal et du ciment en vue de la création de poutres très légères et de haute résistance* ([LBA] 1901 (32)). The invention was fine-tuned with the complementary patents of 7 August 1893 (redefining the *étrier*) and 18 December 1897 (*la poutre continue*).

Expansion of the territory

These patents constituted the basis for the organisation of *la maison Hennebique*, as they ensured the commercial exploitation of his invention. The organisation, by means of a system of local agents and concessionaries, was as ingenious as the system itself: licensed contractors were to send projects to the central bureau or to local, registered agents, where well-trained engineers and draughtsman drew up detailed plans, indicating the configuration of the reinforcement, the composition of the concrete and the section of the structures. In return of this fully guaranteed, tailored service, the concessionaries had to transfer an honorarium to the bureau, up to 10% of the total amount of the executed works.

The minimum requirements, together with the exclusive rights and the simultaneous policy of centralisation (studies) and decentralisation (execution), lead to a rapid expansion of Hennebique's empire. The number of agents proliferated from 3 in 1894 to 32 in 1900. Around 1909, when the number of agents had increased up to 60, the growth curve – at least when it comes to registered agents – gradually came to a standstill: on the eve of the First World War, 55 agents and 741 contractors were aligned (Delhumeau 1999, p. 134). The number of executed works was ever-increasing though. The exponential growth curve starts with a mere six executed works in 1892, 1129 works in 1900 and 1970 in 1908 ([LBA] 1908, *Relevé ...*). In a brochure of 1913, issued on the occasion of the World's Fair in Ghent, the outturn of the past twenty years was estimated at 30 000 works, representing a turnover of 600 million ([LBA] 1913, *Exposition ...*, back page). Incidentally, the 1913 brochure is not entirely consistent with the annual reviews of the state of affairs; in point of fact, conjuring with figures seems to have been a frequent practice in the firm's publicity department.



Figure 1: *Le Béton Armé*; (1898, 1(11), front and back page)

Prevalence and publicity

To consolidate and expand this worldwide network of concessionaries, Hennebique organized, from 1897 until 1905, *Les Congrès Annuels de Béton du Ciment Armé*. These three-day annual meetings, enriched with exhibitions, lectures by prominent figures and members of the Hennebique family, banquets and excursions, were to

stimulate both the outward solidarity and the inward competition. The same underlying principle can be recognized in the foundation of the monthly journal *Le Béton Armé* (1898-1939). Next to other recurrent topics (such as official reports or *procès verbaux*, experiments and calamities testifying to the absolute supremacy – especially in regard to fire safety and earthquake resistance– of reinforced concrete over masonry and iron, the accounts of the annual congresses, the presence of *le Béton Armé système Hennebique* at World's Fairs,...), an important place in the journal was occupied by the large body of agents and concessionaires. A list of the agents and concessionaires, as well as an outline of their respective executed works, was included every month, thus giving shape, identity and coherence to the extensive network and realm established by Hennebique (Fig 1.).

Within the framework of an ambitious publicity campaign, the journal was an important means to impose and validate the authority of Hennebique in concrete construction. Furthermore, he thereby strove to assume control over the technical press (i.e. in particular *Le Ciment*, as this journal was rather favourable towards some of Hennebique's main competitors; Delhumeau 1999, p. 182). The title of the journal is truly revealing: by baptizing it *Le Béton Armé*, he thus claimed the material proper and the entire field of concrete construction. Although the content and discourse of the journal gradually changed throughout the years, with the recommencement of the publication after the First World War as an important turning point, the main strategy or policy was to convince and to prevail. "It is evident that the company's magazine by itself characterized the Hennebique phenomenon and the concept of monopoly which inseparably accompanied it. ... Hennebique aimed, from the very beginning, at a vast diffusion of reinforced concrete, associated with the typical characteristics of his system, to the point of claiming to have invented the material itself." [transl.] (Delhumeau 1992a, p. 15).

The journal knew a wide circulation: generally between 3 000 and 10 000 copies were printed (with an exceptional zenith of 21 000 copies for the special issue on the Risorgimento bridge in Rome). It was spread to all the corners of the world by the concessionaires, having a compulsory subscription. (For the publicity strategy of Hennebique, see also Delhumeau 1999, pp. 173-225 (*Valorisation et diffusion*); Simonnet 2005, pp. 89-93 (*Une presse technique originale*); Delhumeau 1992a, p. 14)

LE BÉTON ARMÉ. ORGANE DES AGENTS ET CONCESSIONAIRES DU SYSTÈME HENNEBIQUE

The charter of foundation

The first issue of *Le Béton Armé*, which can be considered as the charter of foundation, was published in June 1898. It commences with a compendious survey on the origins of reinforced concrete, i.e. Hennebique's crucial contribution to the conception of the new material, the legitimacy of this *magnifique invention* and its corroboration by time. Moving on to the innovative organisation with agents and concessionaires, the annual congresses were not deemed sufficient though to augment the cohesion of this vast network:

The Congress itself, not satisfied with the mere three days a year to exchange ideas, has, for the second time, manifested its express wish for an organ, ... that keeps everyone abreast of innovations, which occur almost on a daily basis now. During the February 1898 session, the Congress has definitively founded the journal and established its title. ... It is to become an assemblage of material provided and produced by the concessionaires and agents. So that everyone sends in a few notes, photographs or *procès-verbaux* of all the executed works, questions, thoughts and wishes: it is both a public and private platform between the concessionaires, in which everything will be received and included by the high benevolence of Mr Hennebique. ... Furthermore, it is understood that the journal will pleasurably include all the scientific, technical or artistic communications that are sent to us by engineers and architects that support our propositions. [transl.] ([Le Comité] 1898 (1), p. 2)

The committee concluded by drawing attention to the twofold lay-out of the journal: by analogy with the public and private sessions of the congresses, the journal would comprise a public section, printed on white paper, and a private section, printed on rose-tinted paper; the latter was to be distributed only among the concessionaires and agents. However, no complete issues of the journal, i.e. including both the public and the private section, have been preserved (Delhumeau 1999, p. 186). The only rose-tinted documents that have been kept, are the lists of the agents and concessionaires. One is thus easily inclined to take the announcement as wishful thinking, yet cross-references in later articles to the private section confirm its existence. Furthermore, the (public) collection of *Le Béton Armé* is today very rare: nor the National Library in Paris, nor the libraries of the *École des Ponts et Chaussées* or the CNAM hold the collection (Simonnet 2005, p. 91). The present article is based on the collection of the University Library in Ghent (holding approximately 300 issues, stemming from different sub-collections), supplemented with single issues from the Hennebique archive at the *Centre d'archives (Fonds Bétons Armés Hennebique)* in Paris.

The (hagiographic) editorial staff

Conceived as a platform for and by the concessionaires and agents, the editorial staff was also recruited from within the Hennebique ranks. During the early years of publication, Samuel de Mollins (Hennebique's agent in Switzerland) acted as chairman and Hennebique's son Edouard, residing in Brussels, was secretary. The other members of the editorial staff of that day were F. Perret (agent in Rennes and manager of the editorial office

in Rennes), Eugène Le Brun (agent in Nantes), J. Martinez (staff member and son-in-law of the Paris concessionaire A. Dumesnil) and Eugène Ribéra (Hennebique's agent in Spain).

In 1900 the directorate (i.e. François Hennebique himself) was transferred from 54 Boulevard Saint Michel to the new headquarters 1 Rue Danton. From 1901 onwards, when the editorial office was likewise transferred to Rue Danton, Paul Gallotti acted as editor in chief. He was assisted by nine agents and concessionaires, mainly from France (de Mollins being the sole foreigner). In point of fact, Gallotti was solely responsible for the greater part of the articles (incidentally, the other members of the editorial staff were no longer mentioned by name from 1908 onwards). With his "enthusiastic and militant language, punctuated with polemic episodes" [transl.] (Simonnet 2005, p. 91), Gallotti determined the coherent discourse of *Le Béton Armé*, up until World War I.

Steering a middle course between information and persuasion

The course of action and policy of the early years, as preconceived in the first issue, purposed to stimulate the expansion and bear witness to the prevalence and the legitimacy of *le système Hennebique*. In the first issue, a balance was achieved between documentary and informative communications. Four procès-verbaux were included (concerning three railway bridges and one floor construction in Switzerland, most likely all sent in by Samuel de Mollins), plus an endorsed tender for a pedestrian bridge in Lorient. The documentary features were prefaced by a short editorial on railway bridges, of which the language is rather predictive in regard to the later policy: "Small metallic railway bridges are seriously defective [e.g. the cost price and maintenance]. ... None of this with *le système Hennebique*" [transl.] ([LBA] 1898 (1), p. 2). Next, the articles of the informative columns (*Revue des Journaux, Résumé de quelques brevets français récemment délivrés, Bibliographie*) treated 'outside' developments and innovations, e.g. an expedient to paint cement surfaces. The issue was concluded with the regular features *Travaux du Mois* (comprising six records), *Offres & demandes de matériel* and *Correspondance* (both still empty).

Keeping in mind the biased nature of the journal, the tone of the first issue was in all still relatively objective and factual. Yet shortly afterwards (in point of fact the year after), this alters, as the demarcation between information and persuasion gradually faints. For instance, from 1899 onwards, the journal routinely reproduced the annual congress' addresses. Extended over several issues, these tendentious articles (the laudations inclusive) were highly contributory to the discourse.

Presumably in order to increase the journal's sphere of action and to fight shy of a simple flysheet image, the tendentious communications were compensated by articles from independent prominent figures and authoritative sources. Balancing out engineering and architecture, the two most often cited authors are engineer Charles Rabut and architect Louis-Charles Boileau. Suchlike communications, often mere reproductions or recapitulations of other journals (e.g. *Le Génie civil, La Construction moderne, L'Architecture*) were thus to contribute to the objectiveness and the scientific weight and value of the journal (notwithstanding the fact that they were obviously carefully screened for 'supporting the journal's propositions'). Moreover, in perfect line with this regular feature of *Opinions autorisés sur le béton armé* (Boileau 1907 (106)), the editorial staff occasionally sent articles to other journals, whereupon this alleged objective and independent source was reproduced in *Le Béton Armé* (Delhumeau 1999, p. 193).

Among the Belgian authorities that were given the floor, the most prominent is engineer Paul Christophe, vice-secretary of the Central Committee for Public Works in Brussels. In 1899, Christophe had published a series on *Le béton armé et ses applications* in the journal *Annales des Travaux publics de Belgique*. Published as a monograph in 1902, the compilation was recognized as one of the first, valuable compendiums in the field on concrete construction (Kurrer 2008, p. 721). These writings were to a large extent based on Christophe's report of the 1899 Hennebique congress in Paris, to which he was dispatched by the Belgian government. As he had thus given a prominent role to Hennebique, *Le Béton Armé* readily reproduced these articles in extenso between July 1899 and April 1900. This pioneering work signifies an important contribution to the genesis of reinforced concrete in Belgium; Christophe referred to some of the earliest applications of reinforced concrete in Belgium, e.g. the courthouse (1896) and school of music (1897), both in Verviers, and the Pain Perdu-bridge (1899) in Ghent (Christophe 1899 (16, 17, 19)).

In the debate on reinforced concrete in architecture (focussing on the want for an appropriate design language for this amorphous material), a communication by Louis Cloquet (professor at Ghent University) was reproduced. Analyzing the virtues of reinforced concrete in regard to architectural forms and structures, Cloquet illustrated his article with the apartment building he had designed in Ghent. Yet he concluded with a critical remark on the use of concrete in façades, still too often lacking in expression; whereupon the editors – appealing to Rabut – felt obliged to add that it was only a matter of time before this new architecture would arise (Cloquet 1908 (117)).

The mythical episode of the invention of 'le Béton Armé système Hennebique'

Hennebique repeatedly emphasized the strong bond which *le Béton Armé système Hennebique* maintained with Belgium, the cradle or mother country of reinforced concrete: "Reinforced concrete was born in Belgium: it was born of a French father, on foreign soil. Yet I must admit that I was not a foreigner in Belgium. ... I was Belgian." [transl.] (Hennebique 1899 (12), p. 2) Although one can question his brash and rather unsubstantial statement, claiming no less than being the sole inventor of reinforced concrete, the linguistic usage and tone of this statement are revealing and fit perfectly within the Hennebique strategy. The phrase is taken from Hennebique's address at the *Troisième Congrès du Béton de Ciment Armé*, during which he seized the opportunity

to recite the genesis of his invention. The speech was reproduced in its entirety in *Le Béton Armé* (Hennebique 1899 (10-12)). Next to its militant character, what strikes one most is the vagueness and inaccuracy, presumably deliberated, in order to enhance the enigmatic eminence of his invention.

As the (hi)story goes, Hennebique embarked upon the question of reinforced concrete in 1879, when a friend –he parenthesizes that he always had the chance to consider and to keep his clients as friends– asked him to construct a country house, which first and foremost had to be fireproof. The selfsame day Hennebique and his client were to visit the construction site to attend the construction of the first floors, they witnessed an enormous fire, destroying a large industrial building. The building was constructed in the same way as Hennebique was about to proceed for the country house. Analyzing the deficiencies of so-called fireproof floor types in iron and masonry, Hennebique came up with two golden rules: first of all, dispose of all the wood and, secondly, surround the iron joists with incombustible materials or, “c’est bien facile” he adds, envelop them in concrete. Thereupon, for two or three months, Hennebique sought for a solution in which iron and cement were combined rationally and economically, with the *idée fixe* to decrease the dead weight, to push upwards the neutral line and to increase the lever arm of the iron section. After this conceptual phase, Hennebique resumed the construction of the country house. It was by means of a lucky coincidence however, that the decisive step in the development of this new floor type was taken. When constructing the attic floor, Hennebique was short of iron joists. He thereupon replaced the bottom and upper flange of the joist by cylindrical bars, connecting them with punched plates. Yet threading these punched plates with the cylindrical bars proved to be highly intricate. Subsequently, when constructing the gardener’s house the year after, Hennebique replaced this punched plate with the now legendary stirrup or *étrier*.

The system thus being practically applicable, Hennebique used it exclusively in all the construction he executed. Yet he was prompt to add that he had not proceeded imprudently or hazardously: from 1879-1880 onwards, he had tested –and broken– numerous beams in reinforced concrete in a warehouse in Brussels. By means of these experiments and the acquired experience, he refined the theoretical concept and practical application of the stirrup and conceived *la poutre dissymétrique*. Nevertheless, he did not publicize his discovery until 1892; after all, he adds, “I am not in the habit of advertising” [transl.] (Hennebique 1899 (11), p. 2). The delay was primarily due to unawareness, as he did not realize that it was a goldmine. He only became conscious of the innovative character of his system in 1892, when he perused American scientific journals, so he said, to study the development of low pressure steam radiators in America, in the scope of the heating and ventilating system he had to install in an industrial building. The selfsame day he came to recognize the possibility to turn his invention to account, he applied for a patent. The self-confessed ignorance is promptly transformed into business acumen, when he cleverly adds that “if I would have patented my invention in 1878, nobody would have been interested in it, as I did not have a single construction to demonstrate it’s worth, whereas in 1892, upon my arrival in Roubaix, I was then able to say: ‘I have already built constructions like this during the last seventeen years’” [transl.] (Hennebique 1899 (12), p. 2).

Comparing Hennebique’s narrative with the results of Delhumeau’s inquiry, the discrepancies are illustrative. For instance, Hennebique kept silent about J.J.Septon, a Belgian industrialist, yet Septon presumably played a decisive role in the early years of Hennebique’s expansion (Delhumeau 1999, p. 104). Hennebique’s account of the genesis of the *étrier* is even more questionable: he gives the impression that the concept of the *étrier* was well-established in the 1880s, yet the exact concept and definition was not determined until 1893, with the essential addition to the 1892 patent (Delhumeau 1999, p. 93). Whereas the silence about Septon might be considered a question of honour, the misrepresentation in the case of the *étrier* is probably a commercial and juridical safeguard: Cottancin, one of Hennebique’s main competitors, had petitioned the nullification of Hennebique’s patent on the *étrier*. The verdict was given in December 1900 by the *Tribunal de la Seine*: Cottancin was deemed dishonest and his petition was disallowed. *Le Béton Armé* made sure to publish this verdict in extenso, including the patents at issue ([LBA] 1901 (32)).

The Hennebique family in Belgium

Ascertaining the relationship between *Le Béton Armé* and Belgium, a close reading revealed that Belgium is proportionally well presented in the journal. One of the first remarkable constructions is the Dubois-Petit apartment building in Brussels by architect Paul Saintenoy, entirely constructed in reinforced concrete ([LBA] 1900, *Relevé...*, p. 17). Demonstrating the versatility of reinforced concrete in regard to the decorative arts, the building can thus be considered as the Belgian version of *Rue Danton* or *Bourg-la-Reine*. Yet as it obstructed the king’s view, the building was demolished a few years later (Liber 1903 (66)). As for engineering works, the Mativa bridge in Liège (constructed for the 1905 World’s Fair, engineer Bada) was met with high appreciation. With a total length of 80m (the central arch spanning 55m) and a section of merely 35cm at the crown, the slimline bridge was considered as “*le pont idéal par excellence*” (Gallotti 1906 (95), p. 56). Provisionally tested before the opening of the World’s Fair, the live load testing was carried out during the Fair, presenting an unequalled scene: for two hours, 520 infantryman and 450 cavalryman successively crossed the bridge, in quick time and on the double, to the accompaniment of military music (Gallotti 1905 (88)).

The general policy of *opinions autorisés* also was applied to Belgium: the Belgian press was covered (e.g. *Annales des Travaux publics de Belgique*, *Chronique des Travaux publics*, *L’Émulation*) and (favourable) communications by highly placed persons were recorded. Next to Paul Christophe or Louis Cloquet, for instance Léon Govaerts (chairman of the Society of Architects in Belgium) reminisced about the birth of reinforced concrete during the sixth annual conference (Gallotti 1902 (45)), whereas A. Flamache (engineer in chief of the railways

in Belgium) condemned metallic railway bridges under the telling heading *Le Rivet, voilà l'ennemi!* (Gallotti 1902 (51)).

Looking into Hennebique's agents and concessionaires in Belgium, three agents are mentioned in 1899 (in Brussels, Antwerp and Ghent), yet only two concessionaires. This disproportion might signify a wishful market forecast, nevertheless a few years thereafter, the agencies in Antwerp and Ghent are given up. As for the concessionaires, the number rapidly increased to 11 in 1900 and 27 at the eve of World War I. Between 1919 and 1931, we see a gradual yet considerable increase (from 31 up to 80), after which it slowly diminished. These figures do not correlate to the number of executed works though. Notwithstanding strong and capricious fluctuations –generally between one and twenty per month– and incomplete numerical data, one can discern an overall upward trend. In all, the number of works executed until August 1939 totals up to 5 300.

Plus d'incendies désastreux

The journal repeatedly referred to Hennebique's prime solicitude, from the very first outset, to build fire-resistant constructions (cf the famous brochure, entitled *Plus d'incendies désastreux*, published already in August 1892). In fact, every opportunity (or calamity) was seized to claim the absolute superiority of reinforced concrete to other construction methods. Under the heading *Usines incendiées*, in June 1901 an account was given of two almost simultaneous fierce blazes in two factories near Brussels. Whereas the first, a paper factory in Haeren, was completely destroyed, the cotton mill in Court-Saint-Etienne on the other hand, constructed according to *le système Hennebique* in 1898, was nearly undamaged ([LBA] 1901 (37)). Suchlike accidental stories, reproduced with clock-like regularity, were consolidated with reports on fire experiments. For instance, repeated references are made to the extremely harsh tests on the pavilion constructed by Hennebique on the occasion of the *Exposition provinciale de Gand* (1899).

The language of these accounts is sometimes rather provocative. In 1901, Paul Gallotti reported on the fire at the Entrepôt Royal in Antwerp and surveyed the resulting insurance claims, which amounted to several millions. Wondering why insurance companies, in order to reduce these claims, did not enforce the use of reinforced concrete, of which the virtues in regard to fire were indisputable, he advanced the following thesis: reinforced concrete would push back the risks to such an extent, that the premiums and thereby the profits would become too marginal (Gallotti 1901 (39)). In 1902, the municipalities decided to reconstruct the entrepôt in reinforced concrete, *système Hennebique*.

Corroboration by time and practice

Perusing the (nearly) complete collection of *Le Béton Armé*, indoctrination is almost inescapable, if it were not for the too apparent militant and biased tone. The numerous deficiencies of masonry ("joints!") and iron ("rivets!") are reiterated at every opportunity and thereupon contrasted with the incombustibility, versatility, practicability and monolithic nature of reinforced concrete, pre-eminently its characteristic properties. Whenever possible, these claims were illustrated with spectacular photographs (e.g. the famous –retouched– pictures of the milling house in Tunis).

Notwithstanding the commendable intentions of creating "an organ of mutual instruction for the concessionaires and agents, ... and for anyone who is interested in the developments of reinforced concrete" [transl.] ([LBA] 1901 (40), p. 1), the thin line between propaganda and provocation or polemic was frequently traversed. For instance, the policies of the administrative departments were frequently and bluntly criticized. At first rather inoffensive (petitioning for the general application of public contracts and competitions in regard to public works), the criticism became sharper when the much vaunted *Circulaire Ministérielle* was promulgated. Although the appointment of the preparatory committee in 1901 was much applauded (in point of fact, Hennebique was a member of this committee), *Le Béton Armé* revised its attitude when the findings of the committee were crystallized into the circular. They refused to recognize it, mainly because the point of departure, e.g. the determination of a fixed modulus of elasticity or reinforced concrete, regardless of the configuration of the reinforcement, was considered faulty (Quesnel 1909 (137)). As it was discordant with reality, *Le Béton Armé* proceeded to advocate *le système Hennebique*, which had repeatedly proven its worth through time ([LBA] 1907 (107)). The simple, transparent yet practical calculation methods and principles of *le système Hennebique* were furthermore confirmed by experience of many years' standing (Gallotti 1902 (55)).

The same argument of many years' practical experience was put forward when Hennebique's patent was nullified in December 1906. Hennebique had instituted legal proceedings against some of his competitors for counterfeiting, yet the Court of Appeal decided against him. *Le Béton Armé* pointed out though, that the nullification of the patent did not invalidate its principles. In fact, as the patent became public property, the competition was expected to become more strong yet ignorant at the same time; it was thus, then more than ever, necessary to rely on the (technical) efficiency and experience of *la maison Hennebique* ([LBA] 1906 (103)).

On the eve of the First World War, *le système Hennebique* had found wide application and the virtues of the new material were generally accepted. *La maison Hennebique* and *Le Béton Armé* were still highly reputable, as *L'Architecture moderne* noted in 1911: "Le Béton Armé is a powerful agent in the popularisation of the new material. ... It is not merely a publicity instrument; moreover, as recognized by all, it is an outstanding collection of the most useful documentation. Widely circulating, it is one of the most important technical journals" [transl.] ([LBA] 1911 (155), p. 55). Notwithstanding these laudatory words, there seems to be a slow, gradual change in the discourse of *Le Béton Armé* from 1906-1907 onwards. The arguments become exhausted and the dynamic

seems to diminish: the journal became increasingly repetitive, all too often referring to the same quotable authors and well-known examples, using the same famous slogans. In all, "the limits of the firm's commercial discourse became apparent" [transl.] (Delhumeau 1999, p. 195).

LE BÉTON ARMÉ. REVUE TECHNIQUE ET DOCUMENTAIRE DES CONSTRUCTIONS EN BÉTON ARMÉ SYSTÈME HENNEBIQUE

Recommencement after the war

After a five-year interlude, *Le Béton Armé* is reissued in March 1919. With a new subheading, *Revue technique et documentaire des Constructions en Béton Armé Système Hennebique*, and a renewed program, the editors wanted to broaden the scope of the journal: the prime objective was to inform specialists (i.e. the members of the Hennebique family) as well as non-specialists, about new developments in the general field of concrete construction ([LBA] 1919 (1)). Although the editorials still largely highlighted the virtues of *le système Hennebique*, this declaration of intent was put into practice by means of new columns with a widened scope: *Notices descriptives* (discussing new techniques and processes), *Bibliothèque Documentaire* (summaries and cross-references to newly published works on art, science and construction), *Le coin du Liseur* (a selection of the periodical literature) and finally *articles signés de personnes d'une incontestable compétence* (e.g. an elaborate study on the architecture of the Middle Ages by A. Robida). Despite this ambitious program, the journal met with difficulties and only appeared sporadically during the first years. From October 1924 onwards, the journal again appeared on a monthly basis until August 1939. Almost immediately however, it becomes clear that the initial laudatory effort to become a leading, topical journal, orientated towards an enlarged readership, has not survived.

In comparison with the pre-war edition, the renewed *Le Béton Armé* had been robbed of its lustre, militancy and informative value. To a certain extent, this progressive decline mirrors the loss of ground of the Hennebique trademark. Upon his decease in 1921, the organization seems to have been affected by the loss of creative force and driving spirit. Although the volume of business was still considerable during the interwar period, the renown and the identification Hennebique had established between the new material and his organization gradually disappeared; the material had become public property (Parent 1993, pp. 10-11). Furthermore, the firm lost part of its individuality and personality as it proved to be very difficult to stand out among many other *bureau d'études*. The firm closed down in the middle of the 1960s, with almost 150 000 (preliminary) designs and projects to its credit (Delhumeau 1999, p. 22).

Saviez-vous?

Despite the considerable difference in content, lay-out and impact between the pre-war and interwar editions, some of the early (sometimes deplorable) tendencies can be perceived or are confirmed in the renewed edition: first and foremost, the reproduction of articles and the references to authoritative sources; secondly, the strong increase of the advertisement columns (up to 30 pages with advertisements versus only 8 to 16 pages of articles and photographs). Generally an issue comprised only two or three articles, which sometimes even mainly consisted of full-page photographs. Furthermore, as the reproduction of other journals became common practice at a certain time, only a relatively small number of articles was original. For instance between June and December 1931, each article was originally published in another journal (i.e. *Le Génie civil* and *La Construction Moderne*). In the 1930s, several articles were reproduced from the Belgian journal *La Technique des Travaux*. Founded in 1925 by the *Société des Pieux Franki*, this leading journal reported on international developments in the field of (concrete) construction and counts as an important work of reference. That *Le Béton Armé* referred to this journal is therefore –given the declaration of intent of 1919– not surprising. Throughout the years, the identification between the journal and the firm gradually declined. When the layout of the journal was (again) renewed in September 1932, the name Hennebique even disappeared from the title (*Béton Armé. Revue mensuelle technique et documentaire des Constructions en Béton Armé*). Also, the list of the executed works was no longer included after the First World War, and from 1935 onwards, the list with the concessionaires was replaced by an advertisement, only mentioning the most important agents. Consequently, nor the (geographical) realm nor the volume of business can be assessed by means of the journal. In all, whereas the first editions of *Le Béton Armé* were sometimes pure propaganda, during the interwar period the journal's individuality and its informative value decreased considerably.

In 1934, a turning point in this changing discourse can be perceived, as the connection between the journal and the firm was again highlighted. A case in point is the regular feature *Saviez-vous?*, included at the end of each issue. By means of a thematic or geographic approach, these phrases recollected the results that were achieved the last 40 years: "Did you know that the first bridge in reinforced concrete was constructed by Hennebique in 1894 in Viggen?" [transl.] ([LBA] 1934 (317)), "Did you know that over 1 000 churches were constructed in reinforced concrete by Hennebique?" [transl.] ([LBA] 1935 (331)), "Did you know that over 5 000 constructions are build in Belgium by Hennebique?" [transl.] ([LBA] 1938 (365)). This tendency to highlight the achievements gradually increased throughout the second half of the 1930s. For instance in 1938-1939, on the occasion of the fiftieth anniversary of *le Béton Armé système Hennebique*, lavishly illustrated articles recollect its origins and the heyday. By way of an appropriate conclusion, the very last issue graphically retells the story of 50 years of reinforced concrete in Belgium, its mother country ([LBA] 1939 (378)).

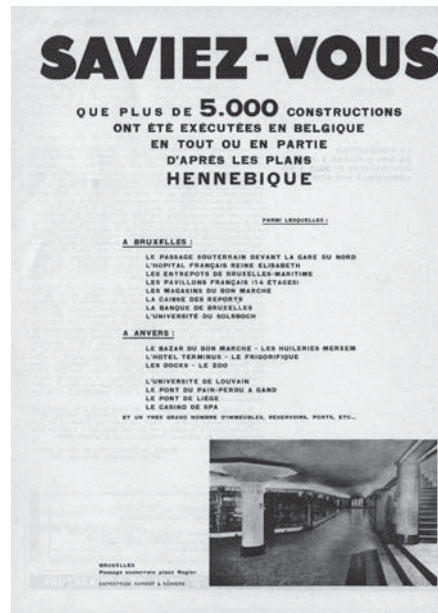


Figure 2: Hennebique in Belgium; (1938, *Le Béton Armé* (365), last page)

UN ORGANE D'ENSEIGNEMENT MUTUEL

Throughout its 50 years' existence, *Le Béton Armé* can be considered as an important means to grasp the legacy of François Hennebique. As a mutual organ of instruction, *Le Béton Armé* gave shape, identity and coherence to the extensive network. Yet as the network expanded and a critical threshold was passed, the journal could no longer meet this need for coherency and lost its *raison d'être*. The difference between the issues that were published before World War I and during the interwar period is telling.

Due to its commercial discourse (i.e. imposing and validating the authority of Hennebique in concrete construction), the collection is signified by a biased view: the competition is completely nullified, as are conflicts within the network. Notwithstanding the discrepancy between the discourse and the proper history of the firm and of reinforced concrete in general, the collection signifies an important work of reference. Among the technical periodicals and specialist publications, the journal occupies an important, pioneering position. Rendering an account of the exponential development of concrete construction, *Le Béton Armé* reflects the nascent state and amassment of knowledge and experience in concrete construction, from its origination until the interwar period.

REFERENCES

- Boileau, L.C., 1907: Opinions autorisées sur le Béton armé. *Le Béton Armé* 10(106), p. 33-35.
- Christophe, P., 1899: Le béton armé et ses applications. *Le Béton Armé* 2(16), pp. 1-8.
- Christophe, P., 1899: Le béton armé et ses applications. *Le Béton Armé* 2(17), pp. 1-5.
- Christophe, P., 1899: Le béton armé et ses applications. *Le Béton Armé* 2(19), pp. 1-4.
- Cloquet, L., 1908: L'Emploi du béton armé en architecture. *Le Béton Armé* 11(117), pp. 17-24.
- Delhumeau, G., 1992a: Hennebique and Building in Reinforced Concrete around 1900. *Rassegna* 49, pp. 15-25.
- Delhumeau, G., 1992b: Hennebique, les architectes et la concurrence. In: Potié, Ph.; Simonnet, C. (eds.) et al.: *Culture Constructive (Les cahiers de la recherche architecturale 29)*. Paris: Parenthèses, pp. 33-52.
- Delhumeau, G., 1999: *L'invention du béton armé: Hennebique, 1890-1914*. Paris: Norma.
- Delhumeau, G.; Gubler, J.; Legault, R.; Simonnet, C.; Parent, C., 1993: *Le béton en représentation. La mémoire photographique de l'entreprise Hennebique 1890-1930*. Paris: Institut français d'architecture.
- Gallotti, P., 1901: L'incendie des Entrepôts d'Anvers. *Le Béton Armé* 4(39), pp. 38-39.
- Gallotti, P., 1902: 1892-1902. Dix ans de Béton Armé. *Le Béton Armé* 5(55), pp. 109-115.
- Gallotti, P., 1902: Le 6e congrès du Béton armé. *Le Béton Armé* 4(45), pp. 113-115.
- Gallotti, P., 1902: Le Rivet, voilà l'ennemi! *Le Béton Armé* 5(51), pp. 43-44.
- Gallotti, P., 1905: Exposition Universelle de Liège. *Le Béton Armé* 8(88), pp. 129-130.
- Gallotti, P., 1906: De l'Esthétique dans la construction des Ponts. *Le Béton Armé* 9(95), p. 45-56.
- Gubler, J., 1993: Les beautés du béton armé. In: Delhumeau, G. et al.: *Le béton en représentation. La mémoire photographique de l'entreprise Hennebique 1890-1930*. Paris: Institut français d'architecture, pp. 9-11.
- Hennebique, F., 1899: Troisième congrès du Béton de Ciment Armé. *Le Béton Armé* 1(11), pp. 1-5.
- Hennebique, F., 1899: Troisième congrès du Béton de Ciment Armé. *Le Béton Armé* 1(10), pp. 1-4.
- Hennebique, F., 1899: Troisième congrès du Béton de Ciment Armé. *Le Béton Armé* 1(12), pp. 1-9.
- Kurrer, K.-E., 2008: *The History of the Theory of Structures*. Berlin: Ernst & Sohn.
- [LBA], 1898: Les Ponts de Chemins de Fer. *Le Béton Armé* 1(1), pp. 2-3.
- [LBA], 1900: *Relevé de Travaux exécutés année 1900*.

- [LBA], 1901: Avis. *Le Béton Armé* 4(40), p. 1.
- [LBA], 1901: Le Béton Armé au Tribunal civil. *Le Béton Armé* 3(32), pp. 1-9.
- [LBA], 1901: Usines incendiées. *Le Béton Armé* 3(37), pp. 11-13.
- [LBA], 1906: A nos Lecteurs. *Le Béton Armé* 9(103), p. 169.
- [LBA], 1907: La Circulaire Ministerielle concernant le "Béton Armé. *Le Béton Armé* 10(107), p. 49.
- [LBA], 1908: *Relevé de Travaux exécutés année 1908*.
- [LBA], 1911: La Maison Hennebique. *Le Béton Armé* 14(155), pp. 54-55
- [LBA], 1913: *Exposition internationale de Gand 1913*.
- [LBA], 1919: Notre nouveau Programme. *Le Béton Armé* (1), pp. 1-2.
- [LBA], 1934: Saviez-vous? *Le Béton Armé* (317).
- [LBA], 1935: Saviez-vous? *Le Béton Armé* (331).
- [LBA], 1938: Saviez-vous? *Le Béton Armé* (365).
- [LBA], 1939: 50 ans de béton armé en Belgique! *Le Béton Armé* (378), pp. 2039-2054.
- [Le Comité], 1898: Le Béton Armé. *Le Béton Armé* 1(1), pp. 1-2.
- Liber, 1903: La Maison Moderne. *Le Béton Armé* 6(66), pp. 86-87.
- Parent, C., 1993: Préface: Matériau, architecture et entreprise. In: Delhumeau, G. et al.: *Le béton en représentation. La mémoire photographique de l'entreprise Hennebique 1890-1930*. Paris: Institut français d'architecture, pp. 13-25.
- Potié, Ph.; Simonnet, C. (eds.) et al., 1992: *Culture Constructive (Les cahiers de la recherche architecturale 29)*. Paris: Parenthèses.
- Quesnel, L., 1909: Lettre ouverte à Monsieur H. Colas. *Le Béton Armé* 12(137), pp 150-151.
- Simonnet, C., 1992: The Origins of Reinforced Concrete. *Rassegna* 49, pp. 6-14.
- Simonnet, C., 2005: *Le béton. Histoire d'un matériau*. Marseille: Parenthèses.

ACKNOWLEDGEMENTS

Much gratitude is owed to David Peyceré and Nolwenn Rannou of the *Centre d'archives d'architecte du XXe siècle*, for their obligingness and the donation of the duplicate copies of *Le Béton Armé* to Ghent University. I also would like to thank Cyrille Simonnet, Luc Taerwe, and the staff of the University Library of Ghent University.

